

“Beyond bias: How behavioral biases shape investment decision-making and perceived financial well-being”

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BEYOND BIAS: HOW BEHAVIORAL BIASES SHAPE INVESTMENT DECISION-MAKING AND PERCEIVED FINANCIAL WELL-BEING

Abstract

This study examines the associations among behavioral biases, Investment Decision-Making, and Perceived Financial Well-Being among individual investors in Indonesia. It distinguishes respondents' involvement in the investment decision-making process from decision quality and investment performance.

A quantitative cross-sectional design was employed using survey data from 505 Indonesian investors. The relationships among Anchoring Bias, Confirmation Bias, Loss Aversion, Overconfidence, Investment Decision-Making, and Perceived Financial Well-Being were analyzed using partial least squares structural equation modeling. Permutation-based multi-group analysis was conducted to compare female and male respondents.

Anchoring Bias, Confirmation Bias, Loss Aversion, and Overconfidence were positively associated with Investment Decision-Making, with path coefficients ranging from 0.144 to 0.215 ($p < 0.05$). Investment Decision-Making was positively associated with Perceived Financial Well-Being ($\beta = 0.527$, $p < 0.001$). The significant specific indirect effects further indicated that Investment Decision-Making statistically mediated the associations between each behavioral bias and Perceived Financial Well-Being. The multi-group analysis showed that only the relationship between Investment Decision-Making and Perceived Financial Well-Being differed significantly by gender and was stronger among female respondents.

The findings contribute to behavioral finance research by showing that behavioral biases are associated with greater self-reported involvement in evaluating, selecting, and monitoring investments. These positive associations do not indicate that behavioral biases improve decision quality, investment performance, or objective financial conditions. Given the cross-sectional and self-reported nature of the data, the findings represent statistical associations rather than causal effects.

Keywords

behavioral biases, investment decision-making,
perceived financial well-being, gender differences,
Indonesia

JEL Classification

D91, G41, G11, I31

INTRODUCTION

The growing involvement of retail investors in financial markets has intensified scholarly attention to the psychological factors associated with investment decisions. This phenomenon is particularly relevant in emerging economies such as Indonesia, where increasing participation by individual investors is accompanied by considerable variation in financial knowledge and investment experience. Behavioral finance studies indicate that investor behavior is frequently associated with cognitive biases and psychological tendencies rather than being based solely on rational evaluation and objective judgment (Kahneman & Tversky, 1979; Barberis, 2018).

Despite the growing body of research, an important issue remains insufficiently examined. Previous studies have predominantly focused on decision outcomes, particularly the association of behavioral biases with irrational choices, excessive trading, and poor investment performance (Barber & Odean, 2001). Although this outcome-oriented perspective is important, it provides only a partial understanding of investor behavior because it gives less attention to investors' involvement in the process through which investment decisions are made.

Investment decision-making does not refer solely to the final choice to buy, sell, or retain an investment. It also involves a series of activities through which investors acquire and process information, evaluate risks and returns, compare available alternatives, and monitor their selected investments. Bettman et al. (1998) conceptualize decision-making as a constructive process in which individuals develop their preferences by processing information and evaluating alternatives. In the investment context, Loibl and Hira (2009) demonstrate that information search is an important component of investor decision-making, while Mishra and Kumar (2012) emphasize the role of information search and processing in mutual fund investors' behavior. Based on this perspective, investment decision-making in the present study is defined as investors' self-reported engagement in evaluating, selecting, and monitoring investments. It is distinct from investment intention, trading frequency, decision quality, and portfolio performance because it does not indicate whether an investment decision is objectively correct or financially successful.

This distinction is also important when investment decision-making is examined in relation to financial well-being. Financial well-being reflects individuals' perceptions of their ability to manage financial matters, maintain financial security, and achieve long-term financial goals (Brüggen et al., 2017). In the present study, financial well-being is therefore treated as a perceived condition rather than an objective measure of wealth, investment returns, or portfolio performance. Although interest in financial well-being has grown substantially, the relationships among behavioral biases, involvement in the investment decision-making process, and perceived financial well-being remain insufficiently examined, particularly in emerging economies (Lusardi & Streeter, 2023).

Accordingly, this study examines whether anchoring bias, confirmation bias, loss aversion, and overconfidence are associated with investors' self-reported engagement in the investment decision-making process and whether such engagement is related to perceived financial well-being among Indonesian individual investors. Rather than assessing whether behavioral biases improve decision quality or investment performance, the study focuses on how these biases are associated with investors' involvement in evaluating, selecting, and monitoring their investments. In doing so, the study complements the predominantly outcome-oriented behavioral finance literature by offering a process-oriented interpretation that integrates behavioral biases, investment decision-making, and perceived financial well-being within a single conceptual model. It also provides empirical evidence from Indonesia as an emerging-economy setting. Given its cross-sectional design, the study identifies associations among the constructs and does not establish causal relationships.

1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Behavioral finance has consistently questioned the assumption that investors always make rational financial decisions. Investment behavior is frequently associated with cognitive biases and

psychological tendencies that affect how individuals interpret and respond to financial information (Kahneman & Tversky, 1979; Daniel et al., 1998; Thaler, 1999; Barberis, 2018). Previous studies have primarily emphasized the adverse consequences of these biases, including suboptimal decisions, excessive trading, and market inefficiencies (Odean, 1998; Barber & Odean, 2001; Shefrin, 2001; Pompian, 2006).

Investors often make decisions under uncertainty, time constraints, and limited information-processing capacity. Under these conditions, they may use heuristics or cognitive shortcuts to simplify complex information (Gigerenzer & Gaissmaier, 2011; Todd & Gigerenzer, 2012; Simon, 2013). These shortcuts may be associated with how investors search for and evaluate information, but their use does not imply better decision quality or investment performance.

Decision-making can be understood as a constructive process in which individuals develop preferences through information search, information processing, and evaluation of available alternatives (Bettman et al., 1998). In an investment context, information search is an important component of investor decision-making (Loibl & Hira, 2009), while Mishra and Kumar (2012) emphasize the role of information processing in investor behavior. Raut (2020) also highlights the importance of examining investment decision-making as a process. Accordingly, investment decision-making in this study is conceptualized as a process-oriented construct that captures investors' self-reported engagement in evaluating risks and returns, comparing investment alternatives, searching for relevant information, and monitoring investments. It does not represent decision quality or investment performance.

Behavioral biases remain relevant in contemporary financial environments, where investors encounter rapidly changing information and market volatility. Digital investment platforms have expanded access to markets and information while also increasing the volume and complexity of information encountered by investors (Alexandri et al., 2023; Dawood et al., 2022; Saha et al., 2024). It is therefore important to examine the associations between specific behavioral biases and investment decision-making.

Anchoring bias refers to the tendency to assign excessive weight to initial information or a reference point when forming a judgment (Tversky & Kahneman, 1974; Epley & Gilovich, 2006; Furnham & Boo, 2011). An initial purchase price, historical price, or early forecast may become a reference against which investors evaluate new information, potentially preventing sufficient adjustment when market conditions change.

Empirical evidence indicates that anchoring remains relevant to investment decision-making. Owusu and Laryea (2023) found that mutual fund investors in Ghana were susceptible to anchoring, while Souza et al. (2024), using PLS-SEM on data from 220 Brazilian investors, found that anchoring was positively associated with investment decision-making. Although previous studies generally measured investment decision-making broadly, their findings suggest that reference points are associated with how investors evaluate information and make decisions. The present study extends this evidence by examining anchoring in relation to process-oriented investment decision-making without interpreting greater involvement in the process as better decision quality.

Confirmation bias refers to the tendency to search for, interpret, and recall information that supports existing beliefs while giving less attention to contradictory evidence (Nickerson, 1998; Rabin & Schrag, 1999; Daniel et al., 1998). Investors may follow financial news, examine market information, and consult others while favoring evidence that reinforces their existing investment choices.

Park et al. (2010) showed that confirmation bias may arise in investors' use of information in online environments, where individuals give greater attention to opinions supporting their existing beliefs. Mohanty et al. (2024) also found that confirmation bias was significantly associated with potential investors' financial decisions in India, although its contribution was smaller than those of recency and familiarity biases. These findings suggest that investors exhibiting confirmation bias may actively search for and evaluate information while processing it selectively. Thus, a positive association with investment decision-making does not necessarily reflect balanced information processing or better investment decisions.

Loss aversion refers to the tendency to assign greater psychological weight to potential losses than to equivalent gains (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992; Barberis, 2013). Loss-sensitive investors may pay closer attention to downside risk, possible capital losses, and uncertainty, leading to greater involvement in evaluating and monitoring investments.

Empirical findings concerning loss aversion and investment decision-making remain mixed. Souza et al. (2024) found a negative association between loss aversion and investment decision-making among Brazilian investors. In contrast, Kumar and Chaurasia's (2024) meta-analysis of 31 studies found a significant positive correlation of 0.492 between loss aversion and investment decisions, although with substantial heterogeneity. These findings indicate that the direction and strength of the relationship may depend on the context, sample characteristics, and operationalization of investment decision-making. In the present study, a positive relationship would indicate greater reported attention to evaluation and monitoring, not improved decision quality. Such involvement may still lead to avoidance, premature selling, or excessively conservative behavior.

Overconfidence refers to the tendency to overestimate one's knowledge, analytical ability, judgment accuracy, and ability to predict outcomes (Odean, 1998; Barber & Odean, 2001; Glaser & Weber, 2007). Overconfident investors may place considerable trust in their own analyses and become more willing to evaluate opportunities independently, select alternatives, and monitor or adjust investments.

Ahmad and Shah (2022) found that overconfidence was associated with investor decisions and performance in Pakistan through risk perception. Almansour et al. (2023) reported a positive association between overconfidence and investment decision-making among Saudi equity investors, while Souza et al. (2024) found a similar relationship among Brazilian investors. Kumar and Chaurasia's (2024) meta-analysis of 23 studies also identified a significant positive correlation of 0.346 between overconfidence and investment decisions. Nevertheless, overconfidence may contribute to excessive trading, disregard for contradictory information, and underestimation of risk (Odean, 1998; Barber & Odean, 2001; Ahmad & Shah, 2022). Its expected positive association with investment decision-making therefore concerns involvement in the decision process rather than decision accuracy or investment success.

Financial well-being reflects individuals' assessments of their ability to meet financial obligations,

maintain financial security, and achieve future financial goals (Brüggen et al., 2017; Netemeyer et al., 2018). In this study, the construct represents perceived financial well-being rather than objective wealth, income, investment returns, or portfolio performance.

Investors who evaluate risks and returns, compare alternatives, search for information, and monitor investments may perceive greater involvement and control in managing their financial resources. Although such activities do not guarantee better decisions or higher returns, they may be associated with perceived financial control, security, and satisfaction. Xiao and Porto (2017) found that financial behavior and financial capability helped explain financial satisfaction, while Riitsalu and Murakas (2019) found that prudent financial behavior was correlated with financial well-being.

More directly, Bai (2023) examined the relationship between investment decision-making and subjective financial well-being. Using PLS-SEM on data from 449 respondents, the study found that investment decision-making was positively associated with financial well-being. Investment decision-making also mediated the relationships of financial literacy, mental budgeting, and self-control with financial well-being. Although the antecedents and sample characteristics differ from those examined in the present study, Bai's findings provide empirical evidence that investment decision-making may connect cognitive and behavioral characteristics with subjective assessments of financial well-being.

Accordingly, investors reporting greater investment decision-making are expected to report higher perceived financial well-being. This association does not establish causality. Because both constructs are measured at the same point in time, individuals who already perceive themselves as financially secure may also become more confident and involved in managing their investments.

Behavioral biases may be associated with investors' information evaluation, information search, risk assessment, and investment monitoring. In turn, investment decision-making may be associated with perceived financial control and security. Investment decision-making may therefore

represent an indirect pathway between behavioral biases and perceived financial well-being. This argument is consistent with Xiao and Porto (2017), who found that financial behavior mediated the association between financial education and financial satisfaction, and Bai (2023), who found that investment decision-making mediated the associations of cognitive and behavioral factors with subjective financial well-being.

This proposed mediation does not mean that behavioral biases improve financial well-being. Investment decision-making may still be based on incomplete information, selective evaluation, or excessive confidence. Given the cross-sectional design, mediation is interpreted as a statistical indirect association rather than a causal mechanism.

Gender may be associated with differences in financial risk tolerance, confidence, and investment behavior. Previous studies suggest that men tend to demonstrate greater overconfidence and willingness to assume financial risk, whereas women generally display more cautious behavior and greater sensitivity to potential losses (Barber & Odean, 2001; Fisher & Yao, 2017; Cupák et al., 2021; Prasad et al., 2021). However, such differences do not mean that every relationship in the model differs by gender. Differences in within-group significance must also not be interpreted as significant between-group differences without formal multi-group analysis. Therefore, gender comparisons are treated as exploratory, and no directional gender hypotheses are proposed. This study aims to examine the associations of anchoring bias, confirmation bias, loss aversion, and overconfidence with investment decision-making and perceived financial well-being among Indonesian individual investors. It also examines the mediating role of investment decision-making and explores gender differences in these relationships.

Based on the theoretical arguments and empirical evidence presented above, the following hypotheses are proposed:

- H1: Anchoring bias is positively associated with investment decision-making.*
- H2: Confirmation bias is positively associated with investment decision-making.*

H3: Loss aversion is positively associated with investment decision-making.

H4: Overconfidence is positively associated with investment decision-making.

H5: Investment decision-making is positively associated with perceived financial well-being.

H6a: Investment decision-making mediates the association between anchoring bias and perceived financial well-being.

H6b: Investment decision-making mediates the association between confirmation bias and perceived financial well-being.

H6c: Investment decision-making mediates the association between loss aversion and perceived financial well-being.

H6d: Investment decision-making mediates the association between overconfidence and perceived financial well-being.

2. RESEARCH METHODOLOGY

This study used a quantitative cross-sectional design to examine associations among behavioral biases, investment decision-making, and perceived financial well-being, as well as differences in these associations between gender groups. Because the data were collected at a single point in time, the findings indicate statistical associations rather than causal relationships.

Data were collected through an online survey using snowball sampling across academic networks, professional associations, and investor communities in Indonesia. This technique was used because a comprehensive sampling frame for individual investors in Indonesia was unavailable. An initial screening was conducted to ensure that respondents had prior investment experience. Of the 523 responses received, 18 were excluded because they did not meet this eligibility criterion, resulting in a final sample of 505 respondents. The questionnaire focused on the context of stock investment decision-making.

All constructs were measured using instruments adapted from previous studies and assessed on a four-point Likert scale. Anchoring bias was adapted from Kaustia et al. (2008) and Raut (2020), confirmation bias from Park et al. (2010), loss aversion from Kahneman and Tversky (1979) and Prasad et al. (2021), and overconfidence from Barber and Odean (2001).

Investment decision-making was operationalized as respondents' engagement in the investment decision-making process, including evaluating risks and returns, comparing investment alternatives, seeking relevant information, and monitoring and adjusting investment decisions. Thus, the construct captures engagement in the decision-making process rather than the quality or success of investment decisions. Perceived financial well-being was measured using instruments adapted from Netemeyer et al. (2018) and Brüggen et al. (2017), reflecting individuals' perceived financial security and control rather than objective wealth or portfolio performance.

The proposed model was analyzed using partial least squares structural equation modelling with SmartPLS 4. The measurement model assessment included indicator reliability, internal consistency reliability, convergent validity, and discriminant validity using the heterotrait-monotrait ratio. The structural model was subsequently assessed using path coefficients, explanatory power, and bootstrapping procedures. The mediating role of investment decision-making was examined through specific indirect effects, while differences between male and female respondents were assessed using multi-group analysis.

3. RESULTS AND ANALYSIS

3.1. Respondent profiles

Table 1 presents the demographic characteristics of the 505 respondents included in the analysis. All respondents reported having prior investment experience.

Table 1. Respondent profiles

Gender	Number	%
Male	245	49%
Female	260	51%
Grand Total	505	100%
Level of Education	Frequency	%
Diploma (Associate Degree)	46	9.11%
Undergraduate Student	1	0.20%
Postgraduate (Master's/Doctoral)	34	6.73%
Bachelor's Degree	361	71.49%
Primary - level	2	0.40%
Secondary - level (senior)	58	11.49%
Secondary - level (Junior)	3	0.59%
Grand Total	505	100.00%
Marital Status	Frequency	%
Single	358	70.89%
Married	147	29.11%
Grand Total	505	100.00%
Birth Range	Frequency	%
Born between 1965–1980	20	4%
Born between 1981–1996	129	25.5%
Born between 1997–2006	356	70.5%
Educational Background	Frequency	%
Economics and Business	379	75.05%
Engineering and Technology	60	11.88%
Social Sciences and Humanities	35	6.93%
Health Sciences	18	3.56%
Natural Sciences	12	2.38%
Religious Education	1	0.20%

The gender distribution was relatively balanced, consisting of 245 male respondents (49%) and 260 female respondents (51%). Most respondents held a bachelor's degree (71.49%) and were single (70.89%). In terms of birth cohort, 70.50% were born between 1997 and 2006, 25.5% between 1981 and 1996, and 4% between 1965 and 1980. The sample was also predominantly composed of respondents with an economics and business educational background (75.05%).

The concentration of respondents in the 1997–2006 birth cohort and among those with an economics and business background should be considered when interpreting the findings. Consequently, the sample may not fully represent investors from older age groups or those with different educational backgrounds, which limits the generalizability of the results.

3.2. Measurement model

The measurement model was assessed by distinguishing between reflectively and formatively measured constructs. Anchoring bias, confirmation bias, loss aversion, and overconfidence were specified as reflective constructs. Investment decision-making was specified as a formative con-

struct because its indicators represent distinct but complementary activities that jointly define investors' engagement in the decision-making process. Perceived financial well-being was also specified as a formative higher-order construct comprising perceived financial security and perceived financial control.

Indicator refinement was conducted sequentially rather than solely through automatic application of a loading threshold. In the initial reflective measurement model, AB5, CB2, CB3, CB5, and OC4 were removed because their loadings were below 0.50. Indicators with loadings between 0.50 and 0.70 were subsequently assessed based on their contribution to composite reliability and average variance extracted (AVE), as well as their theoretical relevance. This procedure resulted in the additional removal of AB2, AB6, CB6, and LA4. The retained indicators continued to represent the essential conceptual domains of their respective constructs.

For investment decision-making, IDM6 was excluded because its emphasis on avoiding emotional or peer influence reflected decision discipline rather than engagement in the investment decision-making process. IDM1–IDM5 were re-

Table 2. Reflective measurement model

Indicators	Outer Loading	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)	VIF
Reliance on initial purchase price in selling decisions (AB1)	0.780	0.670	0.678	0.802	0.505	1.434
Use of previous price as a decision reference (AB3)	0.663					1.207
Influence of initial information despite new information (AB4)	0.718					1.350
Persistence of initial judgment despite new information (AB7)	0.672					1.275
Preference for information supporting initial investment decisions (CB1)	0.857	0.569	0.613	0.775	0.539	1.274
Interpretation of market information to fit existing investment strategy (CB4)	0.768					1.237
Selective recall of information supporting prior investment choices (CB7)	0.530					1.096
Greater sensitivity to losses than equivalent gains (LA1)	0.683					1.158
Avoidance of financial decisions with potential losses (LA2)	0.817	0.559	0.583	0.771	0.532	1.274
Preference for loss avoidance over gain seeking (LA3)	0.683					1.141
Belief in superior investment decision ability (OC1)	0.791					1.849
Low doubt in personal investment decisions (OC2)	0.623					1.397
Confidence in predicting market movements (OC3)	0.715	0.800	0.806	0.857	0.501	1.619
Perceived sufficiency of information for decision-making (OC5)	0.726					1.495
Expectation of positive outcomes from own decisions (OC6)	0.685					1.405
Independence from others' opinions due to self-confidence (OC7)	0.694					1.403

Table 3. Formative measurement model

Construct and component	Outer weight	t-value	p-value	Outer loading	t-value	p-value	VIF
IDM1: Evaluation of risk and return before making an investment decision	0.423	6.147	< 0.001	0.705	15.001	<0.001	1.378
IDM2: Comparison of alternative investment options before making a decision	0.311	4.611	< 0.001	0.643	12.904	<0.001	1.307
IDM3: Consideration of financial goals and investment horizons when selecting an investment	0.386	6.660	< 0.001	0.650	13.143	<0.001	1.138
IDM4: Information search or financial consultation before investing	0.106	1.320	0.187	0.544	8.270	<0.001	1.369
IDM5: Regular monitoring and adjustment of investments in response to market conditions or new information	0.321	5.133	< 0.001	0.603	11.528	<0.001	1.257
Perceived financial security	0.343	3.109	0.002	0.815	14.233	<0.001	1.662
Perceived financial control	0.748	7.877	< 0.001	0.964	39.186	<0.001	1.662

Table 4. HTMT assessment of discriminant validity

Construct	Anchoring Bias	Confirmation Bias	Loss Aversion	Overconfidence
Anchoring Bias				
Confirmation Bias	0.772			
Loss Aversion	0.791	0.680		
Overconfidence	0.731	0.661	0.481	

tained as complementary formative components representing risk–return evaluation, comparison of alternatives, consideration of financial goals and investment horizons, information search, and investment monitoring. The Money Management Stress dimension was excluded from perceived financial well-being because it exhibited a low and negative loading in the initial model. The retained higher-order construct therefore captures perceived financial security and perceived financial control.

The outer weights of IDM1, IDM2, IDM3, and IDM5 were positive and statistically significant. Although the outer weight of IDM4 was not significant ($\beta = 0.106$, $p = 0.187$), its outer loading was positive and significant ($\lambda = 0.544$, $p < 0.001$). IDM4 was therefore retained because information search and consultation constitute an important component of investment decision-making and contribute to the construct's content validity.

Discriminant validity was assessed using the heterotrait-monotrait ratio (HTMT). This assessment was applied to the reflectively measured constructs, namely anchoring bias, confirmation bias, loss aversion, and overconfidence. Investment decision-making and perceived financial well-being were not included in the HTMT assessment because they were specified as formative constructs. An HTMT value below the conservative threshold of 0.85 indicates that two reflectively measured constructs are empirically distinct. The results are presented in Table 4.

All HTMT values ranged from 0.481 to 0.791 and were below the threshold of 0.85, indicating adequate discriminant validity among the reflective constructs.

Model fit was subsequently assessed using SRMR, d_ULS, d_G, chi-square, and NFI. The results are presented in Table 5.

Table 5. Model fit

Fit Index	Saturated model	Estimated model
SRMR	0.072	0.086
d_ ULS	1.423	2.025
d_ G	0.338	0.373
Chi-square	1006.920	1088.686
NFI	0.711	0.688

The saturated-model SRMR of 0.072 was below the conservative threshold of 0.08, while the estimated-model SRMR of 0.086 indicated marginal approximate fit. Because global fit indices serve a supplementary role in PLS-SEM, the model was evaluated further using explanatory power, effect sizes, collinearity, and structural-path significance.

The structural model was then assessed based on explanatory power, collinearity, and effect sizes. Table 6 presents the (R^2), adjusted (R^2), inner VIF, and (f^2) values. Following Cohen (1988), (f^2) values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively.

The four behavioral biases jointly explained 26.9% of the variance in investment decision-making, while investment decision-making explained 27.8% of the variance in perceived financial well-being. All inner VIF values were below 3.00, indi-

cating no critical collinearity. Each behavioral bias had a small effect on investment decision-making, whereas investment decision-making had a large effect on perceived financial well-being.

3.3. Hypotheses testing

Following the structural model assessment, the proposed direct and indirect relationships were tested using bootstrapping. Table 7 presents the path coefficients, standard errors, t-values, p-values, and hypothesis decisions.

As presented in Table 7, all hypothesized direct and indirect associations were positive and statistically significant. Anchoring Bias, Confirmation Bias, Loss Aversion, and Overconfidence were positively associated with Investment Decision-Making, supporting H1–H4. Investment Decision-Making was positively associated with Perceived Financial Well-Being ($\beta = 0.527$, $p < 0.001$), supporting H5. The significant specific indirect effects also supported H6a–H6d. These findings indicate that stronger self-reported behavioral biases were associated with greater involvement in Investment Decision-Making, which was subsequently associated with higher Perceived Financial Well-Being.

Table 6. Structural model assessment

Endogenous construct	(R^2)	Adjusted (R^2)	Predictor	Inner VIF	(f^2)	Effect size
Investment Decision-Making	0.269	0.263	Anchoring Bias	1.695	0.021	Small
			Confirmation Bias	1.381	0.026	Small
			Loss Aversion	1.350	0.021	Small
			Overconfidence	1.509	0.042	Small
Perceived Financial Well-Being	0.278	0.277	Investment Decision-Making	1.000	0.386	Large

Table 7. Direct and specific indirect effects

Relationship	Original sample (O)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values	Decision
Anchoring Bias → IDM	0.161	0.067	2.408	0.016	Supported
Confirmation Bias → IDM	0.162	0.063	2.576	0.010	Supported
Loss Aversion → IDM	0.144	0.053	2.716	0.007	Supported
Overconfidence → IDM	0.215	0.058	3.734	0.000	Supported
IDM → FWB	0.527	0.051	10.257	0.000	Supported
Anchoring Bias → IDM → FWB	0.085	0.038	2.218	0.027	Supported
Confirmation Bias → IDM → FWB	0.085	0.034	2.547	0.011	Supported
Loss Aversion → IDM → FWB	0.076	0.028	2.694	0.007	Supported
Overconfidence → IDM → FWB	0.113	0.035	3.228	0.001	Supported

3.4. Gender-based analysis

Before comparing structural relationships across female and male respondents, measurement invariance was assessed using the measurement invariance of composite models (MICOM) procedure. Configural invariance was established by applying the same indicators, measurement specifications, data treatment, and algorithm settings to both groups. Compositional invariance and the equality of composite means and variances were subsequently examined through permutation. The results are presented in Tables 8 and 9.

Compositional invariance was established for all constructs because the original correlations exceeded their corresponding 5% quantiles and all permutation p-values were greater than 0.05. Equality of composite means was established only for Loss Aversion, whereas equality of composite variances was established for Anchoring Bias, Confirmation Bias, and Perceived Financial Well-

Being. Although full measurement invariance was not established, configural and compositional invariance were confirmed for all constructs. Thus, partial measurement invariance was established, permitting meaningful comparison of the structural relationships between female and male respondents.

Following the establishment of partial measurement invariance, permutation-based multi-group analysis was conducted to compare the structural relationships between female and male respondents. Because no directional gender hypotheses were proposed, two-tailed permutation p-values were used. The results are presented in Table 10.

The permutation-based multi-group analysis revealed a statistically significant gender difference only in the relationship between Investment Decision-Making and Perceived Financial Well-Being. This relationship was stronger among female respondents ($\beta = 0.641$, $p < 0.001$) than

Table 8. MICOM Results for Female and Male Groups: Compositional invariance

Construct	Original correlation	5% quantile	Permutation p-value	Compositional invariance
Anchoring Bias	0.996	0.980	0.618	Yes
Confirmation Bias	0.988	0.968	0.360	Yes
Perceived Financial Well-Being	0.980	0.940	0.256	Yes
Loss Aversion	0.995	0.965	0.655	Yes
Overconfidence	0.996	0.991	0.417	Yes
Investment Decision-Making	0.946	0.928	0.121	Yes

Table 9. Equality of composite means and variances

Construct	Mean-difference p-value	Equality of means	Variance-difference p-value	Equality of variances	Invariance established
Anchoring Bias	0.018	No	0.410	Yes	Partial
Confirmation Bias	0.048	No	0.687	Yes	Partial
Perceived Financial Well-Being	0.027	No	0.529	Yes	Partial
Loss Aversion	0.873	Yes	0.024	No	Partial
Overconfidence	0.001	No	0.009	No	Partial
Investment Decision-Making	0.005	No	0.001	No	Partial

Table 10. Gender-based permutation MGA results

Relationship	Female β	Female p-value	Male β	Male p-value	Difference (Female – Male)	Permutation p-value
Anchoring Bias → IDM	0.086	0.368	0.257	0.001	-0.172	0.202
Confirmation Bias → IDM	0.250	0.001	0.051	0.595	0.199	0.121
Loss Aversion → IDM	0.239	0.001	0.055	0.535	0.183	0.081
Overconfidence → IDM	0.196	0.009	0.218	0.013	-0.022	0.858
IDM → FWB	0.641	0.000	0.384	0.000	0.257	0.013

among male respondents ($\beta = 0.384$, $p < 0.001$), with a between-group difference of 0.257 (permutation $p = 0.013$). No statistically significant between-group differences were found in the relationships of Anchoring Bias (difference = -0.172 , $p = 0.202$), Confirmation Bias (difference = 0.199 , $p = 0.121$), Loss Aversion (difference = 0.183 , $p = 0.081$), or Overconfidence (difference = -0.022 , $p = 0.858$) with Investment Decision-Making.

Although the within-group results showed different significance patterns, these differences do not constitute statistically significant between-group effects. Specifically, Anchoring Bias was significant only among male respondents, while Confirmation Bias and Loss Aversion were significant only among female respondents. Nevertheless, the formal permutation test indicated that the corresponding between-group differences were not statistically significant. Overconfidence was positively associated with Investment Decision-Making in both groups, but its path coefficients did not differ significantly between them.

4. DISCUSSION

The full-sample results support all hypothesized direct and indirect associations. Anchoring Bias ($\beta = 0.161$, $p = 0.016$), Confirmation Bias ($\beta = 0.162$, $p = 0.010$), Loss Aversion ($\beta = 0.144$, $p = 0.007$), and Overconfidence ($\beta = 0.215$, $p < 0.001$) were positively associated with Investment Decision-Making, supporting H1, H2, H3, and H4, respectively. Investment Decision-Making was positively associated with Perceived Financial Well-Being ($\beta = 0.527$, $p < 0.001$), supporting H5. These results offer a different perspective from studies that primarily examine behavioral biases in relation to decision quality, excessive trading, and investment performance (Odean, 1998; Barber & Odean, 2001; Barberis, 2018).

This difference reflects the operationalization of Investment Decision-Making in the present study. The construct captures respondents' self-reported engagement in evaluating risks and returns, comparing investment alternatives, seeking relevant information, and monitoring investment decisions. It does not measure decision accuracy, investment returns, or portfolio performance.

Therefore, the positive coefficients do not indicate that behavioral biases improve investment quality. Instead, they show that respondents reporting stronger behavioral biases also tend to report greater involvement in the Investment Decision-Making process.

The positive association between Anchoring Bias and Investment Decision-Making supports H1. Reliance on purchase prices, previous prices, and initial information may help investors structure complex judgments, but it may also restrict adjustment when new information becomes available (Tversky & Kahneman, 1974; Epley & Gilovich, 2006). Thus, greater decision involvement among investors exhibiting Anchoring Bias does not necessarily mean that they adequately revise their judgments in response to updated information.

Confirmation Bias was positively associated with Investment Decision-Making, supporting H2. Respondents who selected, interpreted, and recalled information consistent with their prior beliefs reported greater involvement in investment decisions. However, such involvement does not necessarily indicate objective or comprehensive evaluation because the information considered may remain selective (Nickerson, 1998; Rabin & Schrag, 1999). This finding should also be interpreted cautiously because Confirmation Bias exhibited relatively weak internal consistency.

The positive association between Loss Aversion and Investment Decision-Making supports H3. Sensitivity to potential losses may be associated with closer risk evaluation and more intensive monitoring of investments. At the same time, it may result in excessive risk avoidance or reluctance to revise unfavorable investment positions (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). The result therefore indicates greater reported decision involvement rather than more effective risk management. Caution is also required because the reliability estimates for Loss Aversion were relatively low.

Overconfidence showed the strongest association with Investment Decision-Making, supporting H4. Confidence in personal knowledge and ability may be associated with a greater willingness to evaluate investment alternatives, make investment deci-

sions, and monitor investment positions. However, it may also reflect self-perception bias and overestimation of personal ability. Overconfidence can increase investment activity without necessarily improving decision quality or investment performance (Odean, 1998; Barber & Odean, 2001).

The positive association between Investment Decision-Making and Perceived Financial Well-Being supports *H5*. Respondents reporting greater involvement in evaluating and managing their investment decisions also reported greater perceived financial security and control. This finding is consistent with research linking active financial behavior with Perceived Financial Well-Being (Xiao & Porto, 2017; Riitsalu & Murakas, 2019; Lusardi & Streeter, 2023). Nevertheless, Perceived Financial Well-Being represents a subjective assessment rather than an objective measure of wealth, investment returns, or portfolio performance. Therefore, the association does not show that greater decision involvement produces objectively better financial outcomes.

The specific indirect effects showed that Investment Decision-Making statistically mediated the associations of Anchoring Bias ($\beta = 0.085$, $p = 0.027$), Confirmation Bias ($\beta = 0.085$, $p = 0.011$), Loss Aversion ($\beta = 0.076$, $p = 0.007$), and Overconfidence ($\beta = 0.113$, $p = 0.001$) with Perceived Financial Well-Being. These results support *H6a*, *H6b*, *H6c*, and *H6d*, respectively. Nevertheless, the significant indirect effects do not demonstrate that behavioral biases cause or improve financial well-being. They indicate that the biases are statistically associated with Perceived Financial Well-Being through respondents' self-reported engagement in Investment Decision-Making. Given the cross-sectional design, these indirect effects should be interpreted as statistical indirect associations rather than causal mechanisms.

Taken together, the findings distinguish involvement in the decision-making process from decision quality. Greater engagement may coexist with selective information processing, insufficient adjustment to new information, excessive loss avoidance, or overestimation of personal ability. Behavioral biases should therefore not be regarded as beneficial simply because they are positively associated with Investment Decision-Making.

The multi-group analysis provides limited evidence of gender differences. The relationship between Investment Decision-Making and Perceived Financial Well-Being was significantly stronger among female respondents ($\beta = 0.641$) than among male respondents ($\beta = 0.384$), with a between-group difference of 0.257 (permutation $p = 0.013$). By contrast, no statistically significant between-group differences were found in the relationships of Anchoring Bias (difference = -0.172 , $p = 0.202$), Confirmation Bias (difference = 0.199 , $p = 0.121$), Loss Aversion (difference = 0.183 , $p = 0.081$), or Overconfidence (difference = -0.022 , $p = 0.858$) with Investment Decision-Making.

The within-group results showed several descriptive differences. Anchoring Bias was positively associated with Investment Decision-Making only among male respondents, whereas Confirmation Bias and Loss Aversion were positively associated with Investment Decision-Making only among female respondents. Overconfidence was positively associated with Investment Decision-Making in both groups. However, a relationship being significant in one group and nonsignificant in another does not establish a statistically significant between-group difference. The formal permutation results therefore do not support broader conclusions that gender moderates the relationships between behavioral biases and Investment Decision-Making.

The stronger association between Investment Decision-Making and Perceived Financial Well-Being among female respondents indicates that reported involvement in evaluating and managing investment decisions is more strongly related to perceived financial security and control in the female group. Nevertheless, the cross-sectional and self-reported nature of the data does not establish that greater decision involvement causes higher financial well-being or that gender causally determines this relationship. Further research is required to examine the mechanisms underlying this group difference.

Several alternative explanations and limitations should be considered. Because all variables were measured through self-reported responses collected from the same participants at one point in time, the results may be affected by common method

bias and self-perception bias. Reverse causality is also possible, as individuals with higher Perceived Financial Well-Being may feel more confident and become more involved in investment decisions. Conversely, more involved investors may be more likely to recognize and report their behavioral tendencies. The cross-sectional design does not establish the direction of these relationships.

The sample was dominated by respondents born between 1997 and 2006 and those with economics or business backgrounds, limiting the generalizability of the findings to older investors and individuals from other educational backgrounds. The relatively weak reliability estimates for several constructs, particularly Confirmation Bias and Loss Aversion, also require cautious interpretation. Future studies should refine the measurement in-

struments, use more diverse and representative samples, employ longitudinal or experimental designs, and include objective indicators such as verified investment activity, portfolio performance, and investment returns.

Overall, this study contributes to behavioral finance research by distinguishing self-reported engagement in Investment Decision-Making from the quality and outcomes of investment decisions. Behavioral biases were associated with greater reported decision involvement, which was subsequently associated with Perceived Financial Well-Being. However, these findings represent statistical associations and do not show that behavioral biases improve investment decisions, investment performance, or objective financial conditions.

CONCLUSION

This study examines the associations among behavioral biases, Investment Decision-Making, and Perceived Financial Well-Being among individual investors in Indonesia. Anchoring Bias, Confirmation Bias, Loss Aversion, and Overconfidence were positively associated with respondents' self-reported engagement in Investment Decision-Making. Investment Decision-Making, in turn, was positively associated with Perceived Financial Well-Being. The significant indirect effects further indicate that Investment Decision-Making statistically mediated the associations between each behavioral bias and Perceived Financial Well-Being.

The study contributes to behavioral finance research by distinguishing involvement in the investment decision-making process from decision quality and investment outcomes. The positive associations found in this study do not indicate that behavioral biases improve investment decisions, portfolio performance, or objective financial conditions. Instead, respondents reporting stronger behavioral biases also reported greater involvement in evaluating risks and returns, comparing alternatives, seeking information, and monitoring their investments. Such involvement may coexist with selective information processing, insufficient adjustment to new information, excessive loss avoidance, or overestimation of personal ability.

The multi-group analysis provides limited evidence of gender differences. Although several path coefficients displayed different within-group significance patterns, only the relationship between Investment Decision-Making and Perceived Financial Well-Being differed significantly between female and male respondents. This relationship was stronger among female respondents. The formal permutation results did not identify significant gender differences in the relationships between the four behavioral biases and Investment Decision-Making. Therefore, the findings do not support broader conclusions that gender moderates the relationships across the model.

From a practical perspective, financial education and investor support programs should address both financial knowledge and awareness of behavioral tendencies. Investors should be encouraged to evaluate alternative information, reconsider initial reference points when new information becomes available, assess potential losses proportionately, and recognize excessive confidence in their knowledge and abili-

ties. These practices may support more reflective investment decision processes. However, the present findings do not establish that such practices improve investment performance or financial well-being.

Several limitations should be acknowledged. The cross-sectional design and reliance on self-reported data prevent causal inference and may introduce common method bias and self-perception bias. Reverse causality is also possible because individuals with higher Perceived Financial Well-Being may feel more confident and become more involved in managing investment decisions. The sample was dominated by respondents born between 1997 and 2006 and those with economics or business backgrounds, limiting the generalizability of the findings to other investor groups. In addition, the relatively weak reliability estimates for several constructs, particularly Confirmation Bias and Loss Aversion, require cautious interpretation.

Future research should refine the measurement instruments, use more diverse and representative samples, and employ longitudinal or experimental designs to examine the direction and mechanisms of the observed relationships. Future studies should also incorporate objective indicators, including verified investment activity, portfolio performance, and investment returns, to determine whether greater involvement in Investment Decision-Making is associated with objectively better financial outcomes.

AUTHOR CONTRIBUTIONS

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